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Development of a Workshop on Construction and Validation of Skill Qualification Tests

by

Roy C. Campbell, Patrick Ford,
and Charlotte H. Campbell

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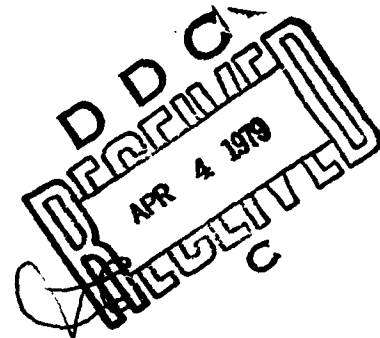300 North Washington Street
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Skill Qualification Tests (SQT) are the quality control instruments for the Army's new Enlisted Personnel Management System. The tests, which are used to evaluate the soldier's job mastery, are developed by personnel in the Army's Test Development Agencies (TDA) responsible for the various job specialties. Since the SQT entails a new performance-oriented approach to proficiency testing, TDA personnel must be trained in the techniques of SQT development.

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The Guidelines for Development of Skill Qualification Tests, distributed to TDA personnel, is a handbook which covers both technical and administrative procedures to be followed in preparing a field-tested SQT. This is a report on the development of a self-contained, self-instructional workshop for TDA personnel which provides guidance and practice on the procedures presented in the Guidelines. The workshop is modelled on the criterion-referenced instruction principles. As TDA personnel participate in the workshop, they work on task selection, review of task analysis, allocating tasks to components, construction and validation of the hands-on, written, and performance certification components, and preparation of the SQT Notice. The report describes development of workshop materials, tryouts of the workshop, and reactions from workshop participants.
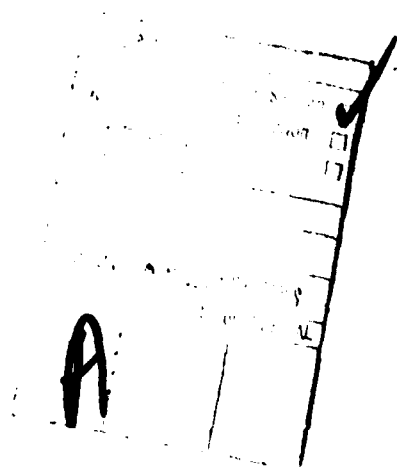
PREFACE

This is the final report of work performed on two projects,
entitled "Development and Evaluation of Self-Instructional
Materials on the Construction of Skill Qualification Tests" and
"Development and Evaluation of Self-Instructional Materials on
the Validation of Skill Qualification Tests." The report de-
scribes the development of the SQT Development Workshop. The
workshop materials are distributed within the Army by TRADOC.

The work was conducted by the Human Resources Research
Organization (HumRRO) under Contract No. DAHC 19-77-C-0005 and
Contract No. DAHC 19-77-C-0013 with the U.S. Army Research
Institute for the Behavioral and Social Sciences. The Radcliff,
Kentucky Office of HumRRO's Western Division performed the work.
Dr. Howard McFann is Vice-President and Director of the HumRRO
Western Division. Mr. William Osborn, in his role as Director
of the Radcliff Office and Project Director, contributed at all
stages of the projects.

Dr. Milton H. Maier, the Contracting Officer's Technical
Representative, provided administrative guidance throughout the
projects.

These projects could not have been successful without the
full cooperation of the Individual Training and Evaluation Direc-
torate (ITED), Training Developments Institute (TDI) and staff and
faculty development personnel at the various schools.

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Finally, MAJ Louis Ollie and SFC Ronald Fry of the TDI SQT

Team deserve special mention for their untiring services throughout

the project.

SUMMARY

As part of the Army's restructuring of the Enlisted Personnel
Management System, the use of Skill Qualification Tests (SQT) has
been introduced as the means of determining individual soldier pro-
ficiency. Implementation of SQT constitutes a significant change
in development and application procedures from previous methods.
Development of SQT is the responsibility of Test Development
Agencies (TDA) that are proponent for MOS. SQT developers at TDA
are subject matter experts for MOS, but often are not familiar with
the procedures required for SQT development. Guidance for SQT
developers has been disseminated in the Guidelines for Development
of Skill Qualification Tests (Individual Training and Evaluation
Directorate, U.S. Army Training Support Center, December 77).
Early experience with SQT, however, indicated the need for train-
ing on the principles presented in the Guidelines. The purpose of
this project was to convert the Guidelines to a self-contained
self-instructional workshop for SQT developers, to tryout the
workshop at selected TDA, and to revise workshop materials based
on the tryouts.

The workshop had to accomodate three constraints: it had to
be exportable to the extent that staff and faculty development per-
sons at the TDA could be trained as course managers and conduct the
workshop as needed to meet TDA requirements; self-paced, to allow
individuals with varying amounts of experience with SQT to concen-
trate on unfamiliar areas; and limited to ten days, to fit the tight

scheduling within TDA. It was also decided that the workshop would be modelled on the principles of criterion-referenced instruction.

The Guidelines contains procedures on nine tasks required in the construction and validation of SQT. Analysis of the nine tasks resulted in the delineation of 34 skills which are subordinate to the nine tasks. For each of the 34 subordinate skills, a module was prepared, containing explanation, examples, and activities addressing that skill. Criterion tests and accompanying evaluation sheets were also prepared for each skill, through which workshop participants demonstrated mastery of the skill according to pre-determined standards.

The workshop materials were reviewed by staff of the Individual Training and Evaluation Directorate (ITED), which is responsible for review of all SQT products, and by the Training Developments Institute (TDI), which is responsible for staff and faculty development and training at the TDA. Based on their review, and on comments from the first tryout of the workshop, the materials were revised. The workshop was then conducted for 20 representatives of 13 TDA selected by TDI. After attending a course manager seminar, these persons acted as course managers, under TDI, ITED, and project staff supervision, at successive implementations of the workshop at 13 TDA. At these workshops, 213 participants from 22 TDA were trained.

As participants completed the workshop, they were asked to respond to an end-of-course critique, eliciting their reactions to the format, content, and impact of the workshop. At all workshops, responses were overwhelmingly positive. Participants' additional

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comments were used in making final revisions to the workshop
materials. The workshop was completed in an average of 7.76 work-
ing days, with 98.7% of participants completing within the 10 days
allotted.

The 13 iterations of the workshop resulted in the certifica-
tion of 18 course managers at 14 TDA. Each of these TDA is now
responsible for implementing the workshop as needed for SQT develop-
ers. Camera-ready copies of all workshop materials were provided
to certified course managers, who reproduce and distribute the
materials for subsequent workshops.

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CHAPTER 1

INTRODUCTION

BACKGROUND

As part of the Army's restructuring of the Enlisted Personnel
Management System (EPMS), a new method of determining individual
soldier proficiency through testing has been introduced. This
method centers on the use of Skill Qualification Tests (SQT) as the
means of testing. Implementation of SQT constitutes a significant
change in development and application procedures from previous
methods.

Development of an SQT is the responsibility of the school or
other agency that is the proponent for the MOS. There are 34 such
Test Development Agencies (TDA). Review and production of SQT pro-
ducts at the Training and Doctrine Command (TRADOC) level is the
responsibility of the Individual Training and Evaluation Directorate
(ITED). This division of labor helps assure that test developers
will have the required level of subject matter expertise, but leaves
open the possibility that they will lack the test development skills
required by the SQT program.

Early implementation of SQT was both large-scale and rapid.
The need for guidance for test developers was initially answered by
the Handbook for Development of Skill Qualification Tests,[1] which
was later published as Guidelines for Development of Skill Qualifi-
cation Tests.[2] This document presented procedures to perform tasks
which ITED had identified as sources of recurring problems in SQT
development.

In addition to the Guidelines, however, a need was perceived
for a controlled, systematic approach to training developers to
apply the principles in the Guidelines. The SQT Development Work-
shop was proposed as a means to provide monitored practice in the
skills required to construct and validate an SQT.

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[1]William C. Osborn, Roy C. Campbell and J. Patrick Ford. Handbook
for Development of Skill Qualification Tests, HumRRO Final Report
77-1, January 1977.

[2]Individual Training and Evaluation Directorate, U.S. Army Training
Support Center. Guidelines for Development of Skill Qualification
Tests, December 1977.

The original plan called for separate workshops to cover the construction and validation of SQT. Although construction and validation at first appeared to be distinct processes, closer analysis revealed that they are inseparable in criterion-referenced testing. This is especially true of the SQT system where validation is a tool for revising and refining a test. Therefore, the work focussed on preparing one workshop.

OBJECTIVE

The objective of the project was twofold:

- To convert Guidelines for Development of SQT to a self-contained self-instruction workshop.

- To try out and revise workshop materials at selected TDA.

The workshop had to accommodate three constraints. The first of these is that it had to be exportable. While responsibility for development of the workshop was assumed by TRADOC, the ultimate responsibility for implementing the workshop rested with each TDA. Since TDA traditionally experience considerable turnover among SQT personnel, they must be able to repeat the workshop as often as their needs dictate.

The decision was made to make the workshop a part of the total Faculty Development Program under the direction of the Training Developments Institute (TDI). At the TDA or school level, the workshop would be the responsibility of the staff and faculty development unit. The requirement then, was that the workshop be exportable to the extent that it could be taught to staff and faculty development personnel, who would then act as course managers at their TDA and conduct the workshop as needed to meet their own requirements.

The second constraint was that the workshop be self-paced. While the TRADOC training philosophy incorporates self-pacing in its instructional model, this was not the only basis for this requirement. People assigned to SQT development can be expected to have a variety of experience. Most will know very little about testing. Other people will know little about the practical limitations of SQT, but be skilled test developers. Thus, as the need to learn about various aspects of criterion test development in general and SQT in particular will vary, the workshop had to allow individuals to work at their own pace.

The third constraint related to the time of the workshop. TDI recommended that ten days be established as the maximum length of the workshop. The limit was needed because of anticipated resistance of managers to allow people to be away from their desks for more than ten days to learn to develop an SQT.

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Development and implementation of an exportable, self-paced,
ten-day workshop proceeded through three phases:

. Development of initial workshop materials.

. Implementation of workshop at selected TDA.

. Evaluation of workshop.

CHAPTER 2

DEVELOPMENT OF INITIAL WORKSHOP MATERIALS

As part of the total Faculty Development Program, TDI had
successfully implemented the Criterion-Referenced Instruction (CRI)
Workshop, developed by Mager Associates. The CRI workshop has
become the foundation for a family of staff and faculty develop-
ment programs that are intended to provide the necessary in-house
training capability in each TRADOC training facility.

According to the CRI model the overall objective for a training
program is broken into subordinate objectives, and training is pre-
sented in modules corresponding to these subordinate objectives.
Within some limits, participants choose the sequence in which they
will work through the modules. At the beginning of each module,
the objective for that module is stated, the criterion test is
described, and resource references for the material are listed.
Each participant decides how much study and practice he needs to
pass the criterion test. A course manager monitors student progress,
evaluates criterion tests, and serves as a learning resource when
required by the student.

Workshop materials were developed to conform to both the for-
mat and the content of this model. Two tasks comprised development
of the workshop materials:

. Prepare materials.

. Review and tryout materials.

PREPARE MATERIALS

The scope of the workshop was dictated by the scope of Guide-
lines for Development of SQT. The purpose of the Guidelines is to
set forth "procedures to be followed by test development agencies
in planning, constructing, and field testing SQT."[1] In the Guide-
lines the three aspects of the purpose are broken into nine major
tasks, listed in the first column of Table 1. The nine tasks were
derived rationally through analysis of procedures required for SQT
development. Necessarily, then, the Guidelines and the workshop
are prescriptive rather than descriptive; that is, they are based
on projections of what should be done, rather than on an empirical
study of how successful SQT development was proceeding at various
TDA.

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[1]Ibid., p. 1-1.

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Table 1

SUBORDINATE OBJECTIVES DERIVED FROM
GUIDELINES FOR DEVELOPMENT OF SQT

Guidelines Tasks	Subordinate Objectives
Select Tasks for Testing	Identify Sources of Information Select Tasks for Testing
Review Task Analysis	Review Task Analysis
Allocate Tasks to Components	Allocate Tasks to Components
Construct Hands-On Component	Determine Product or Process Construct Process Performance Measures Construct Product Performance Measures Determine Tolerance and Time Construct HOC Performance Measures Determine Test Conditions Prepare Examinee Instructions Prepare Scorer Instructions
Tryout Hands-On Component	Locate Defects (Expert Tryout) Compute Scoring Agreement Determine Feasibility Prepare Station Load Table Revise Hands-On Scorable Unit
Construct Written Component	Determine Written-Performance or Performance-Based Prepare Written-Performance Items Prepare Performance-Based Items Set Scoring Standards Construct Written Scorable Unit
Validate Written Component	Collect Self-Ratings Locate Defects (Expert Tryout) Validate Written SU Against Hands-On Select Validation Option Select Sample for WC Validation with Self-Ratings Determine Acceptability of Written SU Validate Written SU: Self-Ratings Validate Written SU: Supervisor Ratings Validate Written SU: Panel of Experts Revise Written Items
Construct Performance Certification Component	Construct Performance Certification Component
Prepare SQT Notice	Prepare SQT Notice

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The first step in preparing the workshop materials was to identify the subordinate objectives within the nine tasks addressed by the Guidelines. The 34 subordinate objectives that emerged are listed in the second column of Table 1. Generally, if the Guidelines task required several distinct skills, each skill was considered to be a subordinate objective. If the Guidelines task was not complex, the task by itself was considered to be a subordinate objective. Some skills were subordinate to more than one Guidelines task (e.g., constructing performance measures was a skill required for construction of hands-on and performance certification components). In such cases the skill was considered to be subordinate only to the task with which it was discussed in the Guidelines.

The second step was to prepare a module for each subordinate objective. A module consists of text that amplifies the decisions and actions in the Guidelines, examples that show how the decisions and actions relate to specific situations, and activities that have the participant apply the decisions and actions to a situation. The examples and activities in the modules make use of sample tasks, which were selected with two criteria in mind:

- The task must illustrate the principle(s) being discussed.

- The task must be familiar to participants.

For the most part sample tasks are common military tasks (e.g., Fire a Claymore Mine, Prepare a Wrist Cast, Complete DA Form 2404).

The activities (or practical exercises) serve two purposes. First, they allow participants to practice the skills being covered. Second, the activities illustrate some of the variations possible when the skill is applied to real world situations. Thus, they serve not only a practical function but also as a learning source. Each activity provides space for participants to analyze the problem and record their own answers, and is followed by feedback which includes rationale for the provided answer.

The third step in developing the materials was to prepare a criterion test for each module. In some cases the criterion tests are standard, that is, all participants work with the same situation or task. In other cases participants work with tasks or material of their own choosing from their selected MOS. The individualized approach was chosen as much as possible within the time constraints for two reasons:

. It would demonstrate the adaptability of the
procedures.

. The obvious job relevance of the materials
would help maintain participants' interest.

About one-half of the criterion tests require participants to
work with their own MOS-relevant tasks. However, these tests cover
all phases of constructing a written and hands-on component of an
SQT. In fact, each participant must produce two complete hands-on
SU and two written SU to complete the workshop.

Standard criterion tests are used for two kinds of situations.
The first situation requires participants to make preliminary
decisions on standard tasks before they make similar decisions on
their selected tasks. In Hands-On and Written Component Construc-
tion, participants work with standard criterion tests on the first
four modules, and then with their own tasks in capper modules. The
second situation for standard criterion tests pertains to tests of
validation and tryout skills. The rationale for this application
of the standard criterion test approach is discussed later under
Review and Tryout of Materials.

The fourth step in developing the materials was to prepare an
evaluation sheet for each criterion test. If the criterion test
was standard, the appropriate solution or solutions were listed.
If the criterion test was based on tasks participants chose, the
evaluation sheet was designed as a checklist a reviewer would follow
to check the work. One of three people was designated to check the
work according to the following rules:

. If the test is standard, the participant is
authorized to check his own work (self
sign-off).

. If the test is based on tasks participants
choose but requires no judgment to review,
a colleague is authorized to check the work.

. If the test is based on tasks participants
choose and requires judgment by the reviewer,
the course manager must check the work.

The rules for identifying the reviewer of the criterion test
were modified after experience with the tryouts. Some participants
concluded that modules they could review by themselves were less
important than other modules, so they skipped them or worked only
superficially. In most cases their error was corrected by later

criterion tests that required them to apply the skills from the previous module. For the final draft of the materials the rule for designating a criterion test as a self sign-off was:

. If the test is standard and the skills or knowledge are required by a later module that the course manager checks, the participant is authorized to check his own work. Otherwise, the course manager will review standard tests.

Similarly, colleague sign-offs were further limited to individualized tests that cover skills and knowledges that the course manager checks in a later module.

Finally, supplementary materials were prepared for course control and participant orientation. These materials include:

. The Course Map, which shows the necessary sequence in which certain modules may be studied.

. The Personal Progress Summary, on which completed criterion tests are signed off.

. The Overview of SQT Development Workshop, which explains the workshop procedures and lists acronyms and abbreviations used in the workshop.

. An additional module, "Review SQT Development Process," which introduces the participant to the Guidelines. The criterion test for this module requires participants to identify their role in SQT development, and to select one MOS with which to work throughout the workshop. This criterion test has a covert objective as well: to give course managers a feel for the various MOS with which participants will be working, and for the way in which the TDA has organized SQT developers.

The workshop materials are being distributed within the Army by TRADOC; copies are available at ARI.

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REVIEW AND TRYOUT MATERIALS

As modules were completed, they were submitted for review to representatives of TDI, ITED and the COTR. Although there was some overlap, TDI reviewers checked the practicability of the activities and criterion tests; ITED reviewers checked consonance with policy; and the COTR checked the scope and coverage of the material. Materials were then revised to incorporate the reviewers' recommendations.

The first tryout of the materials was conducted at Ft. Eustis, Virginia with two representatives of TDI, three test psychologists from ITED, seven SQT developers from the Transportation School, and one representative of the COTR. Three members of the project staff managed the workshop.

Materials were again revised based on experience with the tryout. The major revision was to eliminate required group work from the activities and criterion tests. During development of the materials on validating SQT, the intent had been to require participants to conduct a validation study using other participants as the sample for the hands-on and written SU they had developed earlier. This was found to be impractical for four reasons:

- . Commanders were reluctant to release equipment for the hands-on validation tryouts.

- . Participants resented interrupting their work to serve as subjects for a colleague's validation study.

- . The studies added at least one day to each participant's completion time.

- . The diversity of the participants made it virtually impossible to obtain a pool of people who could perform MOS specific tasks.

For these reasons it was concluded that the benefits did not justify the expense of actual tryouts. In the final materials, validation criterion tests present data from tryouts and require participants to analyze the data and prescribe revisions to be made.

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CHAPTER 3

IMPLEMENTATION OF WORKSHOP AT SELECTED TDA

The workshop was implemented at the TDA through performance of four tasks:

- . Train course managers.

- . Conduct workshop at selected TDA.

- . Evaluate management aspects.

- . Revise course materials.

TRAIN COURSE MANAGERS

As discussed earlier, the workshop was intended to be managed ultimately by staff and faculty development personnel at the various TDA. To meet the TDI requirements as a certified course manager, each course manager trainee first had to complete the workshop managed by the project staff, and then serve as a course manager under the supervision of staff and TDI personnel.

The first step was to conduct the workshop for 20 representatives of 13 TDA selected by TDI. The workshop was conducted at the Xerox International Center for Training and Management Development, near Leesburg, Virginia. The workshop was managed by two people from TDI and one ITED representative, all of whom had completed the workshop during the initial tryout, as well as three members of the project staff.

As participants finished the workshop, they attended a course manager seminar. At that time they were instructed in the steps needed to set up the workshop at their TDA. A member of the project staff then led a discussion of specific modules and criterion tests.

CONDUCT WORKSHOP AT SELECTED TDA

The first workshop at each TDA was conducted by a team of course managers. The team consisted of at least one project staff member, at least one TDI representative, at least one staff and faculty development member from the host TDA who had attended the Leesburg training, and an ITED test psychologist who served as an available resource to participants and provided guidance on policy questions.

Thirteen workshops were conducted at the locations listed in
Table 2. A total of 213 participants from 22 TDA completed the
workshops conducted at the various TDA. Most participants (76%)
were directly involved in SQT development. Their previous experi-
ence with SQT ranged from one month to over three years. The median
among experienced developers was 5.5 months. The 24% with no
previous experience included people newly assigned to SQT, staff
and faculty development personnel, and representatives of the
Directorate of Evaluation.

As a result of the implementation workshops, 14 TDA have the
capability to conduct the workshop without outside assistance. This
means that at least one member of their staff and faculty develop-
ment unit has completed the workshop and has helped manage the
workshop while being observed by the TDI SQT Team. Each TDA with
that capability is marked with an asterisk in Table 2.

EVALUATE MANAGEMENT ASPECTS

During the conduct of the workshop at the various TDA, project
staff personnel observed a number of different management aspects
of the workshop. While some of these aspects were controlled and
some varied as a result of circumstances, they all provided some
insight into efficient workshop operations. The major aspects of
management are:

. Participant to course manager ratio.

. Participant attendance.

. Control of tests and evaluation sheets.

Participant to Course Manager Ratio. The ratio varied among
workshops from 2:1 to slightly over 6:1. The optimum ratio appears
to be around 5:1. This results in minimal participant waiting time
for module sign-offs and maximum utilization of course manager
personnel without encountering course manager fatigue. This ratio
is advisable for at least the first three days of the workshop when
the course manager load is the heaviest. After this, participant
workload tends to spread out and a ratio of 8:1 is not uncomfortable.

Participant Attendance. Although participants were advised
that their progress through the workshop was self-paced, all started
at the same time and were expected to complete the workshop within
the ten-day time period. Participants who attempted to work at
their regular job while completing the workshop, or who attempted
to work at their normal place of duty instead of the workshop area,
tended to fall behind. Some were subsequently dropped from the
workshop.

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Table 2

LOCATIONS AND PARTICIPANTS OF SQT DEVELOPMENT WORKSHOP

Workshop Location	TDA Attending	Participants Trained
Ft. Eustis, VA	Transportation School*	12
	School of Music	1
Ft. Bliss, TX	Air Defense Artillery School*	17
Ft. Gordon, GA	Signal School*	18
Ft. Huachuca, AZ	Army Intelligence School*	10
Redstone Arsenal, AL	Missile and Munition School*	12
	Military Police School	3
	Criminal Investigation Division Command	2
Ft. Benning, GA	Infantry School*	7
	Aviation School	1
Ft. Lee, VA	Quartermaster School*	17
Aberdeen Proving Grounds, MD	Ordnance and Chemical School*	11
Ft. Benjamin Harrison, IN	Institute of Administration*	15
	Defense Information Service	2
	Army Intelligence School (ASA)	2
Ft. Sill, OK	Field Artillery School*	11
Ft. Belvoir, VA	Engineer School*	18
	Chaplain School	2
	Defense Mapping School	1
Ft. Knox, KY	Armor School*	27
	Institute for Military Assistance*	3
Ft. Sam Houston, TX	Academy of Health Sciences*	21

*TDA certified to conduct workshop.

Few participants are willing or able to refuse their supervisors when daily work interferes with the workshop. Maximum workshop benefit is obtained when participants are removed, geographically and psychologically, from their normal work areas. On the other hand, the workshop schedule should not be so rigid that participants are unable to schedule their own time. The recommended approach is to schedule the workshop for six hours per day and require participants to be at the site during that period. While the workshop can be conducted on an open-entry, open-exit basis, experience during the implementation phase suggests that such a delivery mode will increase average time and decrease the percentage of participants who complete the workshop.

Control of Tests and Evaluation Sheets. Two major methods were used to control criterion tests and evaluation sheets. In one, the tests and evaluation sheets were placed in separate boxes in the room and participants were free to get either whenever they wished. In the other method, participants were given all material, including tests and evaluation sheets, at the start of the workshop. In both cases, participants could copy responses from the evaluation sheets if the wanted to. Most participants preferred control of the sheets located in separate boxes. Some participants who had all materials complained that the temptation to look at the evaluation sheet for answers, instead of seeking assistance, was almost overwhelming. It should be noted that, based on the evaluation of the target audience for this workshop, no trial was made of stricter control of the tests and evaluation sheets. Yet on some occasions, participants indicated a desire for more rigid control of these documents. Usually this was prompted by a belief that others were not using the evaluation fairly, thereby somehow penalizing the respondent.

REVISE COURSE MATERIALS

Concurrent with the conduct of the workshops, project staff monitored student reaction both formally, through an end-of-course critique, and informally, through observation and discussion. As a result, several revisions were made affecting the content and organization of course materials.

> . The amount of arithmetical work in the validation modules was scaled down in order to reduce the frustration some participants experienced with these modules.

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. The number of colleague sign-offs was reduced
  and the nature of such interactions was
  restructured to make them more helpful to
  participants.

. Where possible, the number of combat
  support and combat service support tasks was
  increased in the module examples and activi-
  ties to enhance the perceived applicability
  of the principles to a variety of MOS.

CHAPTER 4

EVALUATION OF WORKSHOP

Evaluation of the workshop concerned three issues:

- . Are the materials consonant with Guidelines
  for Development of SQT?

- . Can TDA personnel complete the workshop
  within the time limits?

- . Do TDA personnel perceive the workshop as
  beneficial to their assignment?

The first issue was settled affirmatively during the extensive
reviews of the initial materials. The remaining issues were
considered throughout the implementation phase.

TIME REQUIREMENTS

The 14 workshops (including Leesburg) were attended by 258
people. Twenty-five of the participants were dropped for failing
to maintain attendance. Of the 233 participants who completed all
requirements, 230 (98.7%) finished within ten working days. Days
to completion ranged from three to 13 working days, with an average
completion time of 7.76 days. These results indicate that the
workshop is within the time limit that had been established.

PARTICIPANTS' REACTIONS

As participants finished the workshop, they were asked to com-
plete an end-of-course critique form. The form consisted of 18
statements covering various aspects of the workshop. Participants
indicated their reactions by responding to each statement on a seven-
point scale, from "Strongly Agree" to "Strongly Disagree." The
critique forms were completed by 221 of the 233 participants who
completed the 14 iterations of the workshop. A copy of the critique
form with consolidated reactions is presented as Appendix A.

The first item, dealing with participants' reactions to the
introductory briefing delivered by project staff, elicited varying
responses. Participants who had not been in any self-paced work-
shop before, particularly in the early workshops, indicated that
they did not know where to begin after the briefing. The briefing
was revised after each workshop, until in the last iterations,
participants' responses were more positive.

The remaining 17 items addressed three aspects of the workshop: format, content, and impact. A summary of participants' responses is presented in Table 3, with the 17 items grouped by aspect. It is apparent from the table that the responses were highly skewed in favor of the workshop.

The mean response to each item and the 95% confidence interval about each mean are shown in Figure 1. The confidence intervals indicate the range of values within which we are fairly certain the true mean response lies, exclusive of sampling error. When the interval for an item does not overlap with the interval for another item, we may conclude that the means for those items are significantly different. The width of the interval indicates the distribution of responses to the item: the wider the interval, the greater the variability among responses. Because the data are so highly skewed, it is not possible to determine what aspects, if any, of the workshop participants did not like. Therefore, discussion of participants' reactions will be phrased in terms of which aspects they liked more or less than others.

Format. Six of the statements on the critique form concerned the format of the workshop and mode of presentation. Participants were fairly favorable toward the sequencing of the materials, and toward the self-pacing. There were more negative reactions to the self-pacing than to any other single aspect of the workshop; several participants commented that pressures from their offices made self-pacing impossible for them. Reaction to the style of presentation in the modules was mixed, with comments indicating that some modules required too much busy work.

Although course managers did point out that colleague interaction was permitted at any time during the workshop, there were few specific instructions and no requirements regarding group work. This unstructured approach resulted in little colleague interaction, and participants commented that colleague interaction was not very helpful to them. Course managers also observed that participants were reluctant to disturb other participants with questions or ideas, choosing rather to talk to the course managers. Participant reactions to the availability and helpfulness of course managers was very positive.

Content. Participants were, on the average, less positive about the content of the workshop than they were about format or impact. Some participants felt that the examples and activities, while plentiful, did not clarify all of the principles. They also questioned the technical soundness of the material, adding that their understanding of the policy had differed from the application

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Table 3

RESPONSES TO END-OF-COURSE
CRITIQUE ITEMS, BY ASPECT

Aspect: Format	Response (Percent)[a]		
	Positive	Neutral	Negative
2. Logical sequence of modules	83.2	14.5	2.3
6. Style of modules comfortable	75.0	21.8	3.2
7. Set own pace	84.1	10.4	5.5
12. Sufficient colleague interaction	70.9	25.5	3.6
13. Colleague interaction helpful	66.5	29.4	4.1
14. Sufficient course manager interaction	91.4	8.1	0.5
15. Course manager interaction helpful	95.0	5.0	0.0
Average	80.9	16.4	2.7

Aspect: Content	Positive	Neutral	Negative
3. Sufficient examples, activities	68.8	26.2	5.0
4. Technically sound, consistent with policy	75.9	20.5	3.6
5. Criterion tests measure objectives	81.9	15.8	2.3
9. Sufficient practice in activities, tests	81.0	17.6	1.4
Average	76.9	20.0	3.1

Aspect: Impact	Positive	Neutral	Negative
8. Understanding of principles	84.1	14.5	1.4
10. Mastery of skills	66.1	31.2	2.7
11. Sense of achievement	73.5	24.7	1.8
16. Important to present job	81.9	15.4	2.7
17. Course interesting	82.3	15.4	2.3
18. Worth time and effort	87.7	11.4	0.9
Average	79.3	18.8	2.0

[a] Responses of 1 or 2 are considered Positive, responses of 3, 4 or 5 are considered Neutral, responses of 6 or 7 are considered Negative.
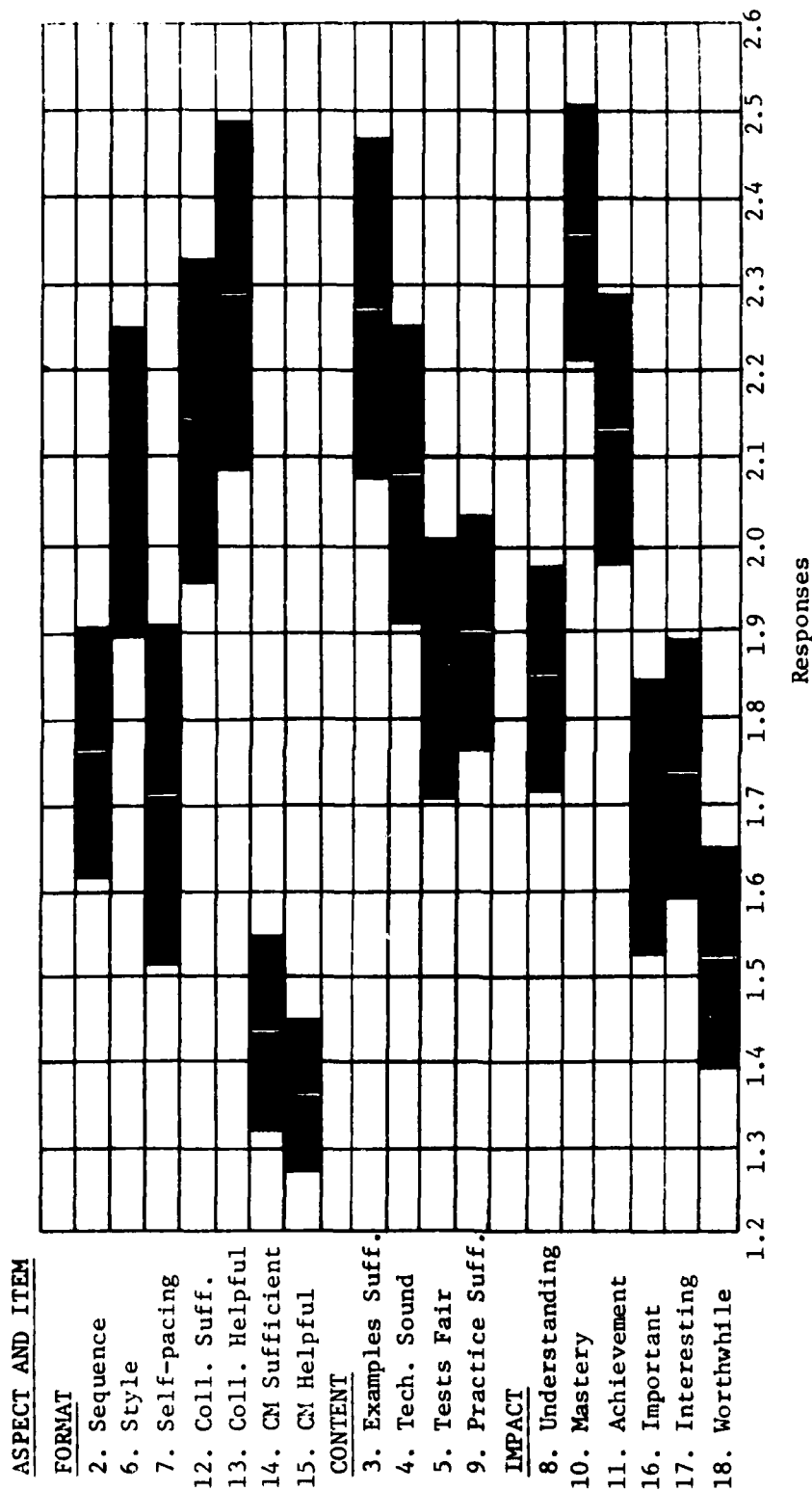
Figure 1

Means and 95% Confidence Intervals
for Responses to End-Of-Course Critique Items
(N = 221)

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in the modules (some participants had not had access to the Guide-
lines before the workshop). Reactions to the criterion tests
were somewhat more positive: they were perceived as a fair mea-
sure of the objectives, and with the activities provided suffic-
ient practice in the skills they addressed.

Impact. Participants offered mixed reactions to the state-
ments regarding the impact of the workshop. Although they felt
they had a fair understanding of the concepts and principles
presented, they were not as positive about their mastery of the
skills. Participants commented that they were reserving judgment
of their mastery until they had tried their newly-acquired skills
on the job. Their expression of a sense of achievement fell some-
where between the positive opinions generated by their understanding
and their opinions concerning mastery. For the most part, partici-
pants felt that the information presented was important to them in
their jobs—this despite the fact that about 20% of them were not
directly involved in SQT development. Most participants found the
course interesting. Overall, they indicated that the course was
worth the time and effort. Although previous work with SQT develop-
ment ranged from no experience to over three years, the amount of
experience was not predictive of participants' perceptions of the
importance or worth of the workshop.

Two additional questions asked whether participants would
recommend the workshop to SQT developers and whether it should be
added to the school's staff and faculty development program.
Almost all participants (98%) endorsed the workshop for SQT devel-
opers. A smaller majority (87%) thought the workshop should be
instituted at their school.

CONCLUSIONS

The end-of-course critique data provide evidence that the
project objectives—to design and implement a workshop, based on
the Guidelines, which is exportable, self-paced, and can be com-
pleted in ten days—were realized.

The first characteristic is exportability, in this case the
extent to which the workshop can be conducted by TDA personnel.
At each of the 13 workshop iterations after Leesburg, the primary
course managers were members of the staff and faculty development
branch of the local TDA. Although they were still in probationary
status, they were responsible for setting up the workshop and for
bearing an equal load with TDI and project staff personnel in
reviewing criterion tests. Participants indicated positive reac-
tions to the contributions of the course managers at all workshops,

with no differentiation made between TDI and project staff course managers and local course manager trainees. These results indicate that TDA personnel who complete the workshop can conduct the workshop successfully.

The second characteristic evaluated was the extent of self-pacing. Most participants (84%) agreed that they set their own pace. The range in number of days to complete the workshop supports their contention.

The third characteristic was whether the workshop could be completed within ten days even though participants set their own pace. As discussed earlier, the workshop is well within that limit.

In the final analysis, the criterion of the project's success would be that workshop-certified SQT developers consistently prepare acceptable SQT products. However, SQT products are almost always the result of contributions from subject matter experts and testing experts who are not workshop-certified, as well as input from other SQT developers. Therefore, even though it is possible to evaluate products, it is not correct to attribute the acceptability (or nonacceptability) of any product to one person.

Because of the absence of an appropriate external criterion, evaluation of this project's success focuses on the internal criteria that the workshop can be implemented within the constraints imposed and that participants demonstrate competency in the skills in the Guidelines before they finish the workshop. These criteria were achieved.

CHAPTER 5

OVERVIEW OF WORKSHOP

As the workshop materials--modules, criterion tests and evaluation sheets--are the principal result of the project, a brief overview is given here. The materials themselves are distributed within the Army by TRADOC and are also on file at ARI.

The nine major tasks discussed earlier were grouped into seven phases of skill development. These seven phases are necessary for complete development. Although emphasis in the workshop is on modules, rather than phases, this overview will proceed by phase.

The first phase, for all participants, is the analysis and planning phase. At the beginning of the workshop, participants select an MOS with which to work, one with which they are familiar. They begin with ten tasks from one skill level of that MOS. In one module, participants identify sources of information on each task that are objective indicators of need for evaluation. In another module, participants group the ten tasks according to the extent of known performance deficiencies. These modules lead participants to select for testing those tasks which promise the greatest payoff in testing. From the ten tasks, a course manager then selects five tasks with which the participant continues to work. Then, in the criterion test for the task analysis module, participants review and, if necessary, revise existing task analysis data for those five tasks to make them suitable for test construction. The final module in the analysis and planning phase covers allocating tasks to components. In the criterion test, participants assign each of their five tasks to the HOC, the PCC, or the WC. High skill physical tasks are allocated to the HOC or the PCC; mental tasks and low skill physical tasks are allocated to the WC.

After participants finish the analysis and planning modules, they branch into either the HOC construction phase or the WC construction phase. During the construction phases, participants work with the tasks selected earlier. For the HOC construction, there are modules for some preliminary decisions called for in the Guidelines. Then they work on modules which require that they construct two complete hands-on scorable units, to include performance measures, conditions, examinee instructions and scorer instructions.

The WC construction phase also requires participants to write scorable units for tasks they selected. They practice constructing two kinds of written test: written performance tests, which require examinees to perform part or all of a task, and performance-based

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tests, which require examinees to answer questions about how a task is performed. For each item and scorable unit, participants also set scoring standards.

After participants finish the construction phase for a component, they move to the validation phase for that component. Here, the activities and criterion tests are standardized, and address the analysis of data and revision of scorable units based on validation results.

The HOC validation procedures check interrater reliability, acceptability, and feasibility. The modules cover locating faults based on a tryout with experts, computing scorer agreement, checking feasibility of a scorable unit, constructing a station-load table, and revising hands-on scorable units.

The WC validation procedure checks discriminant validity and acceptability. Three options for validation are available, based primarily on the number and types of soldiers to which the developer has access. The validation modules cover collecting self-ratings, locating faults based on a tryout with experts, validating written scorable units against hands-on tests, selecting a validation option and analyzing data on each of the three options, and revising written scorable units.

The sixth phase, dealing with the PCC, focuses not only on the procedures for constructing the PCC but also on procedures for validating and monitoring it. Participants again work with one of their own tasks. They describe how the test will be conducted, how it will be validated, what kinds of results would indicate units for follow-up checks, and how the checks will be conducted.

In the final phase, after participants have developed a scorable unit for each component, they prepare an SQT Notice. This is primarily a check on their mastery of the format for the Notice. It also provides an opportunity to clarify any confusing aspect of the preceding materials.

APPENDIX A

END-OF-COURSE CRITIQUE

APPENDIX A

TRADOC SQT DEVELOPMENT WORKSHOP

We are interested in knowing how you feel about several aspects of
the course that you are now completing. Our aim is to develop courses
which are interesting, stimulating, and viewed as valuable by you.
Your honest opinions are needed so that we can refine our procedures
and materials.

Thank you.

WORKSHOP LOCATION:_____ DATE:_____

ORGANIZATION/SCHOOL:_____

How long have you been working with SQT? _____ Months

Below are a series of statements. Rate each as to whether you agree or disagree with it. (Feel free to write comments about your answer in the margins or on the back of the page.)

1. After the introductory briefing, I knew what I was supposed to do.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	71	60	32	22	10	6	6	14	2.43
%	34.3	29.0	15.5	10.6	4.8	2.9	2.9		

2. The modules were logically sequenced.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	118	65	23	6	3	4	1	1	1.76
%	53.6	29.5	10.5	2.7	1.4	1.8	0.5		

3. There were sufficient examples and activities to make the information clear.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	83	69	36	11	11	4	7		2.27
%	37.6	31.2	16.3	5.0	5.0	1.8	3.2		

4. The information seemed to be technically sound and consistent with policy.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	88	79	24	18	3	5	3	1	2.07
%	40.0	35.9	10.9	8.2	1.4	2.3	1.4		

5. The criterion tests were a fair measure of the objectives.

	Strongly Agree			Neutral			Strongly Disagree	No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	106	75	22	8	5	4	1		1.86
%	48.0	33.9	10.0	3.6	2.3	1.8	0.5		

6. The style of presentation in the modules was comfortable.

	Strongly Agree			Neutral			Strongly Disagree	No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	94	71	23	20	5	3	4	1	1.33
%	42.7	32.3	10.5	9.1	2.3	1.4	1.8		

7. I did not feel pressured to complete the course quickly; I set my own pace.

	Strongly Agree			Neutral			Strongly Disagree	No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	160	25	11	8	4	3	9	1	1.71
%	72.7	11.4	5.0	3.6	1.8	1.4	4.1		

8. I feel that I have a good understanding of the concepts and principles presented.

	Strongly Agree			Neutral			Strongly Disagree	No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	89	96	22	10	0	2	1	1	1.85
%	40.5	43.6	10.0	4.5	0.0	0.9	0.5		

9. The activities and criterion tests gave me sufficient practice in sharpening my skills.

	Strongly Agree			Neutral			Strongly Disagree	No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	91	88	25	12	2	2	1		1.90
%	41.2	39.8	11.3	5.4	0.9	0.9	0.5		

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10. I feel that I have a good mastery of the skills offered.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	42	104	45	21	3	5	1		2.36
%	19.0	47.1	20.4	9.5	1.4	2.3	0.5		

11. I feel a strong sense of achievement as a result of demonstrating my competency in the skills offered.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	71	90	30	21	3	2	2	2	2.13
%	32.4	41.1	13.7	9.6	1.4	0.9	0.9		

12. There was sufficient colleague interaction.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	99	57	22	27	7	7	1	1	2.14
%	45.0	25.9	10.0	12.3	3.2	3.2	0.5		

13. The colleague interaction was helpful to me.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	94	53	23	31	11	6	3		2.29
%	42.5	24.0	10.5	14.0	5.0	2.7	1.4		

14. There was sufficient Course Manager interaction.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	157	45	12	4	2	0	1		1.43
%	71.0	20.4	5.4	1.8	0.9	0.0	0.5		

15. Interaction with the Course Manager was helpful to me.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	161	49	5	5	1	0	0		1.35
%	72.9	22.2	2.3	2.3	0.5	0.0	0.0		

16. The information presented in this course appears to be very important to me in my present job.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	148	33	16	16	2	6	0		1.68
%	67.0	14.9	7.2	7.2	0.9	2.7	0.0		

17. I found the course interesting.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	127	55	22	10	2	4	1		1.74
%	57.5	24.9	10.0	4.5	0.9	1.8	0.5		

18. Considering what I knew about SQT at the start of the workshop and what I know now, the workshop was worth the time and effort.

	Strongly Agree			Neutral		Strongly Disagree		No Entry	Mean
	1	2	3	4	5	6	7		
Frequency	153	40	12	13	0	1	1	1	1.35
%	69.5	18.2	5.4	5.9	0.0	0.5	0.5		

Would you recommend this course to other SQT developers?

Yes	No	No Entry
214 (98.2%)	4 (1.8%)	3

Would you recommend this course be available at your school as part of the internal Staff and Faculty development program?

Yes	No	No Entry
186 (87.3%)	27 (12.7%)	8